

Evaluating the suppression of *Hydrilla verticillata* by manual removal and planting two native aquatic plants



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Introduction

- San Marcos River is a spring-fed river in Central Texas
 - Seven endemic and listed species including Texas wild rice
- Invasive plants have encroached into the habitat of the list species
- 25% of the aquatic plants were documented as non-native that accounted for 50% total cover in the river

Texas wild rice (*Zizania texana*)

- Endemic to the upper 3-4 km of the San Marcos River, Hays County.
 - Federally listed as endangered
- Documented to have very fast growth rates and may be a strong competitor against hydrilla



Introduction (cont.)

- Edwards Aquifer Habitat Conservation Plan (2012) was implemented to maintain biological flows, restore and increase habitat for federally listed species, and remove invasive species.
 - Major focus on hydrilla removal and control
 - Manual removal with divers
 - Limited number of native species were allowed to be planted under the EAHCP
- Herbicide use in the river was not allowed

Hydrilla Removal under the Habitat Conservation Plan



Objectives

- Evaluate if Texas wild rice and water stargrass can suppress hydrilla in small plots
- Assess if water stargrass will outcompete Texas wild rice and hydrilla



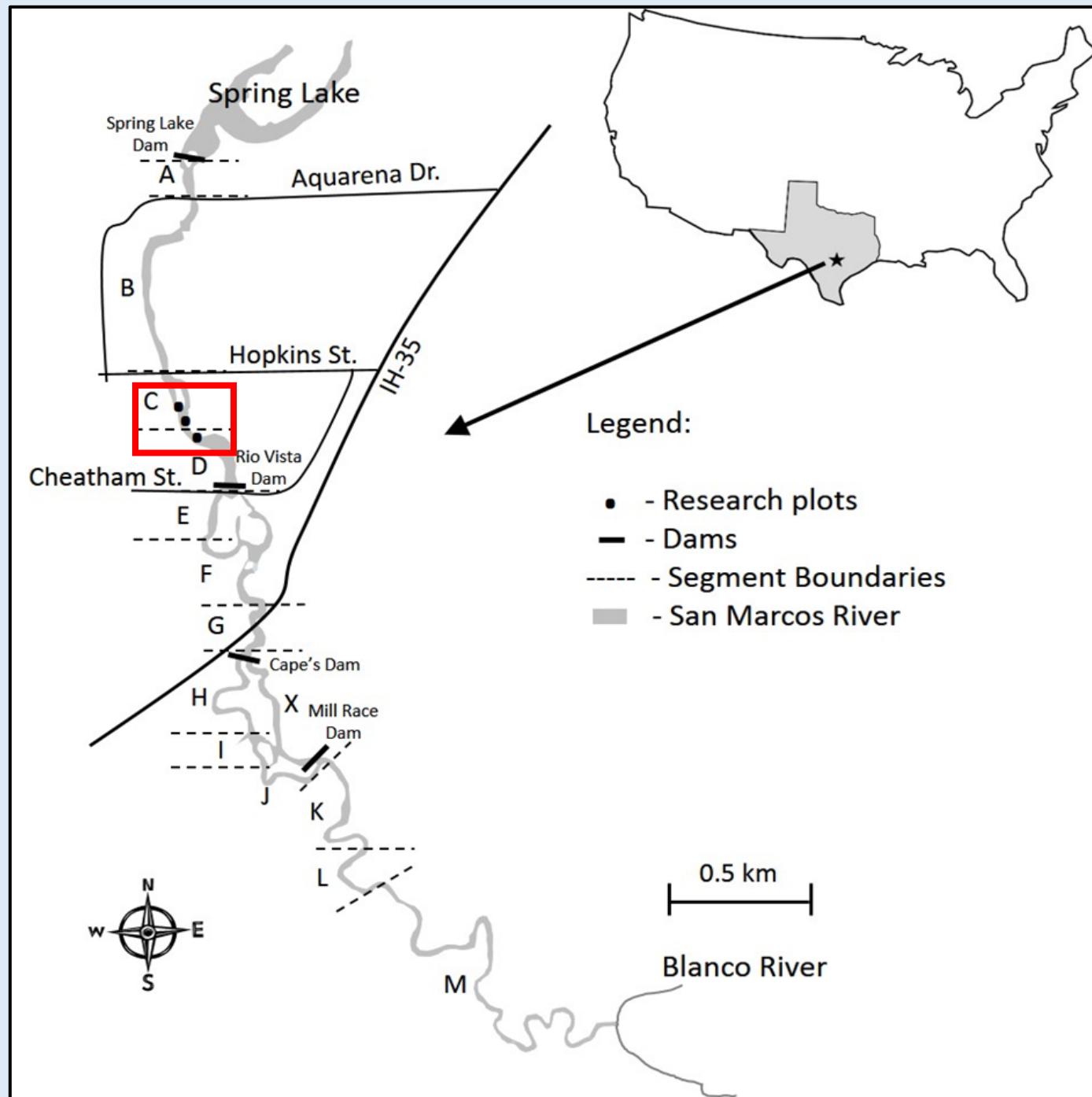
Methods



Study Site

San Marcos River

Hays County,
Texas



Methods

- Texas wild rice and water stargrass were grown in 500 L tanks in the greenhouse
- Hydrilla was removed at 0, 25, 50, 75, and 100% in 0.25 m² plots at 3 sites in the river
- Texas wild rice (n = 5) and/or water stargrass (n = 5) were planted in each plot
- Coverage (%) was estimated monthly
- At 8 months post-planting, the shoots and roots of all plants were harvested and dry weights measured

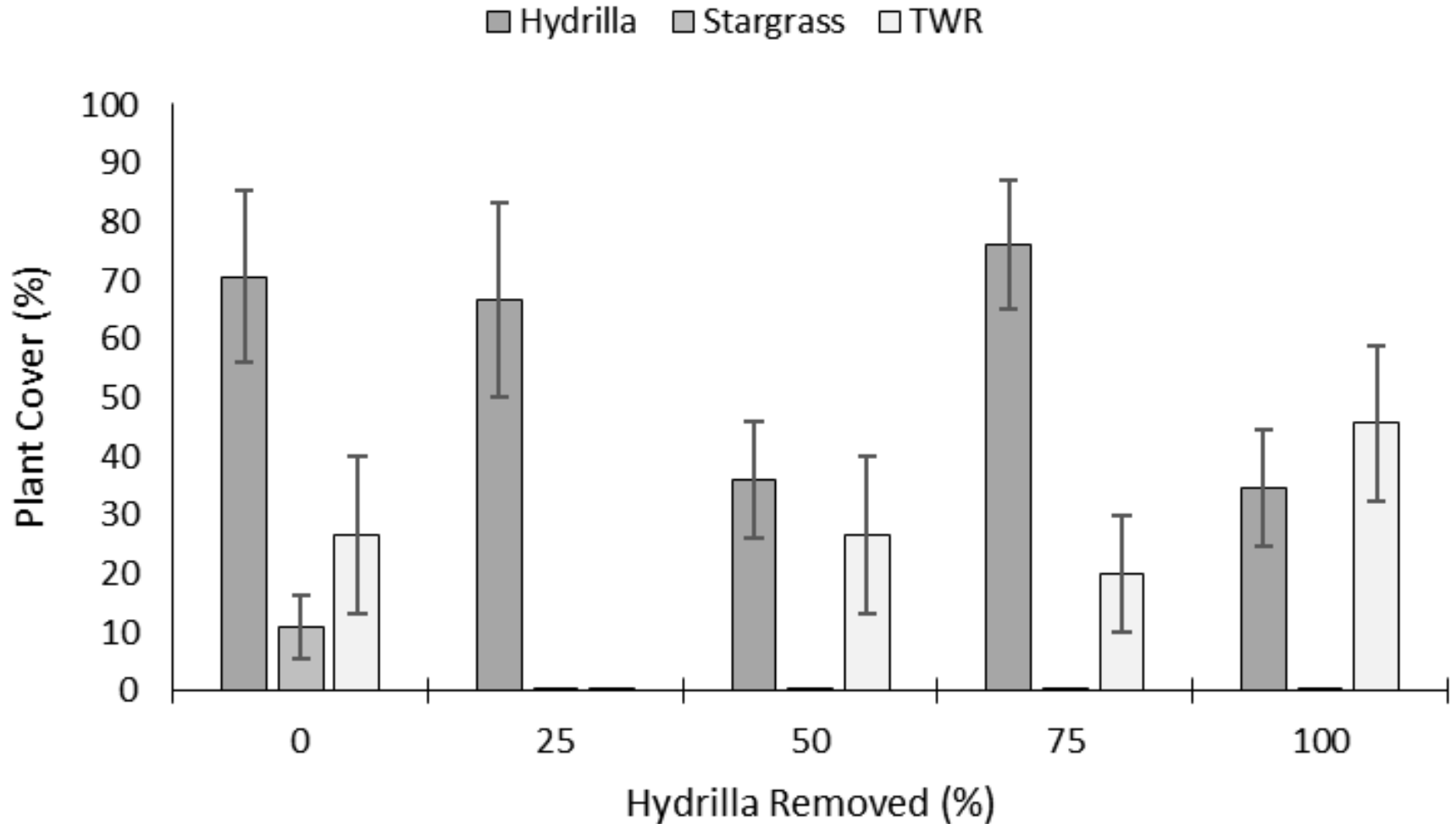
Results



Survival and Coverage at 8 Months Post-Planting

Plant	Survival	Coverage (%)	
		Hydrilla Removed	
	(%)	0%	100%
Hydrilla	100	71	31
Water stargrass	42	2	18
Texas wild rice	50	18	43

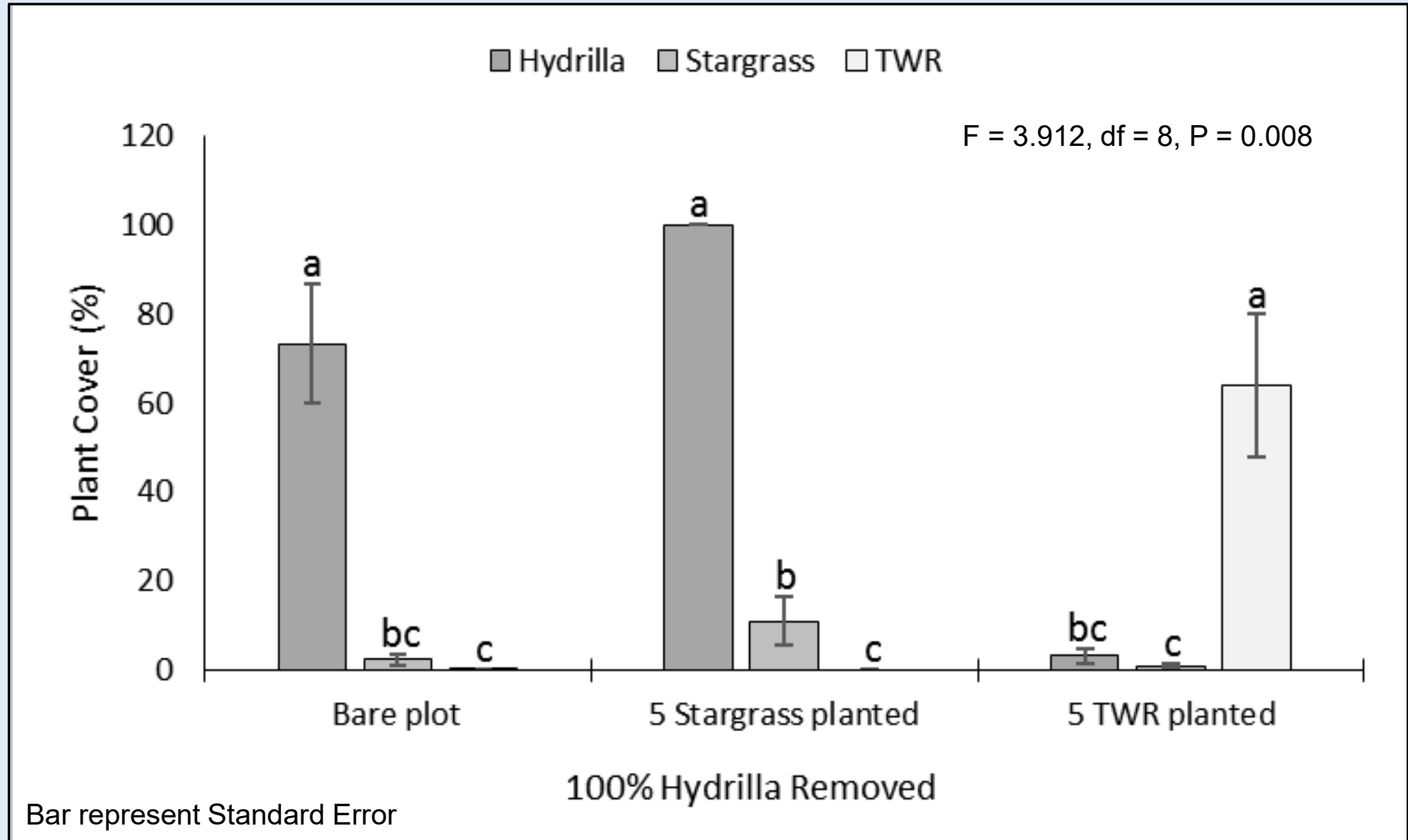
Plant Cover (5 TWR & WSG Planted)



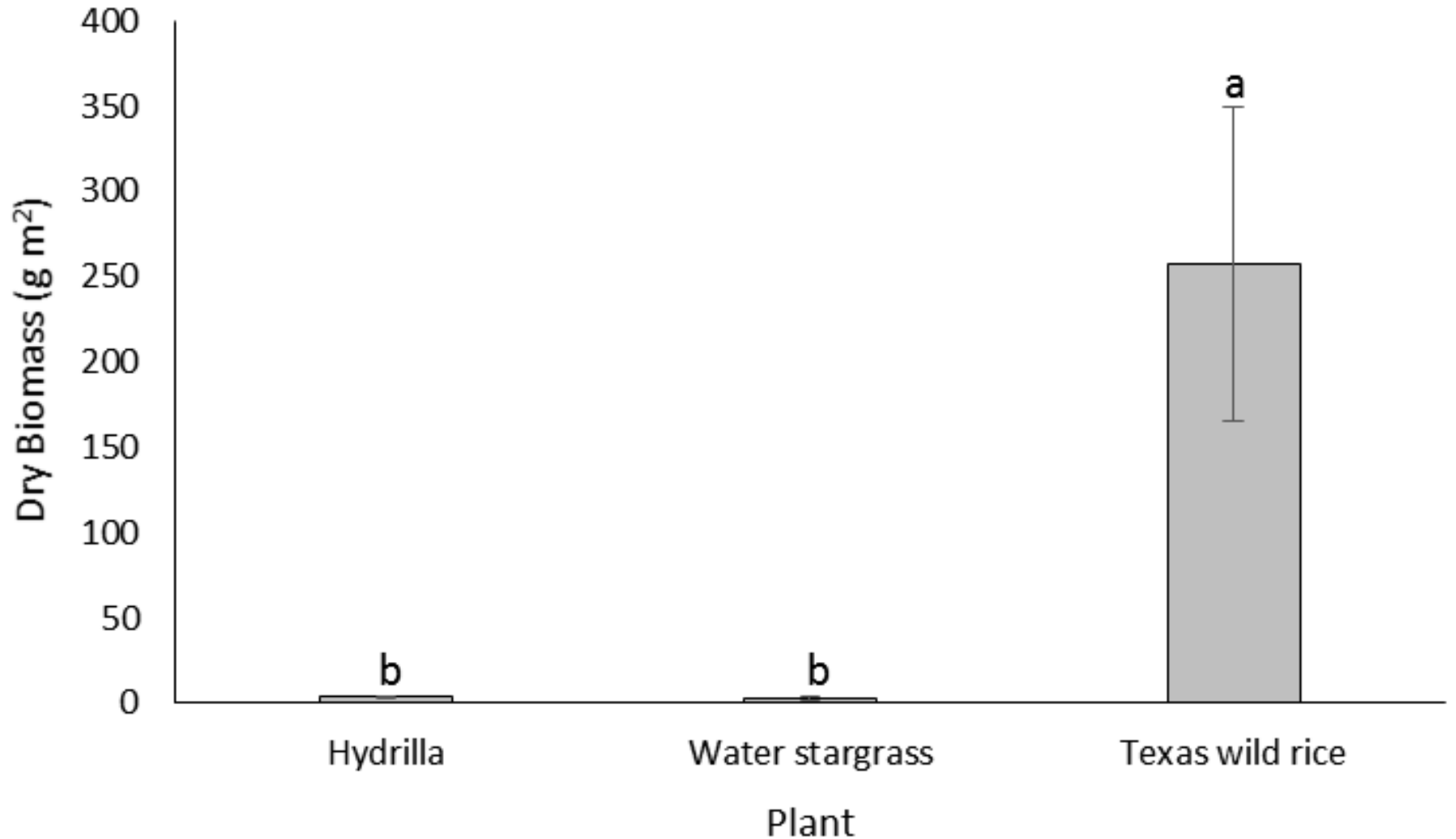
Bar represent Standard Error

$F = 1.481$, $df = 14$, $P = 0.178$

Plant Cover (1 species planted)



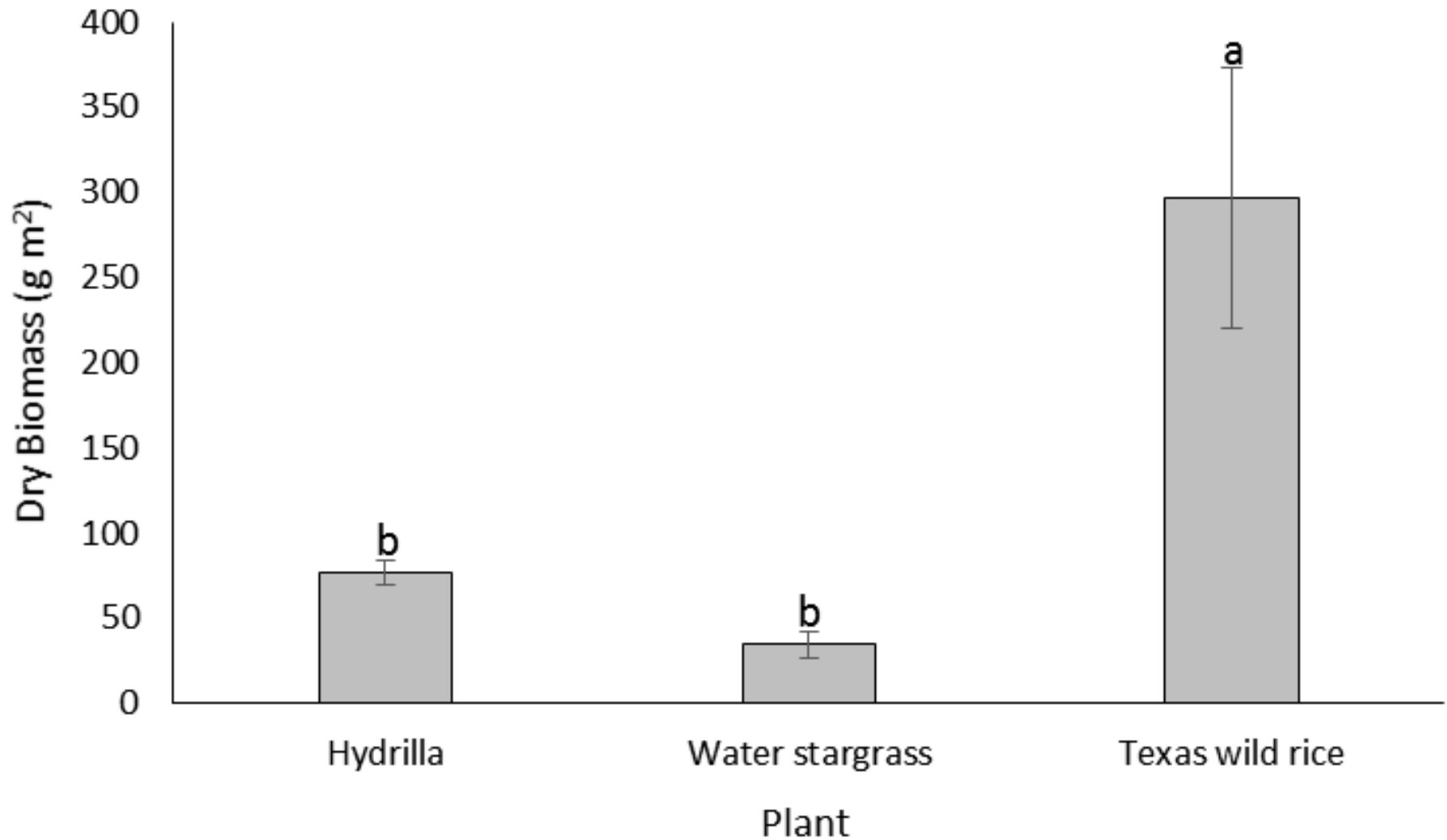
Root Biomass



Bar represent Standard Error

$F = 11.8, df = 2, P < 0.001$

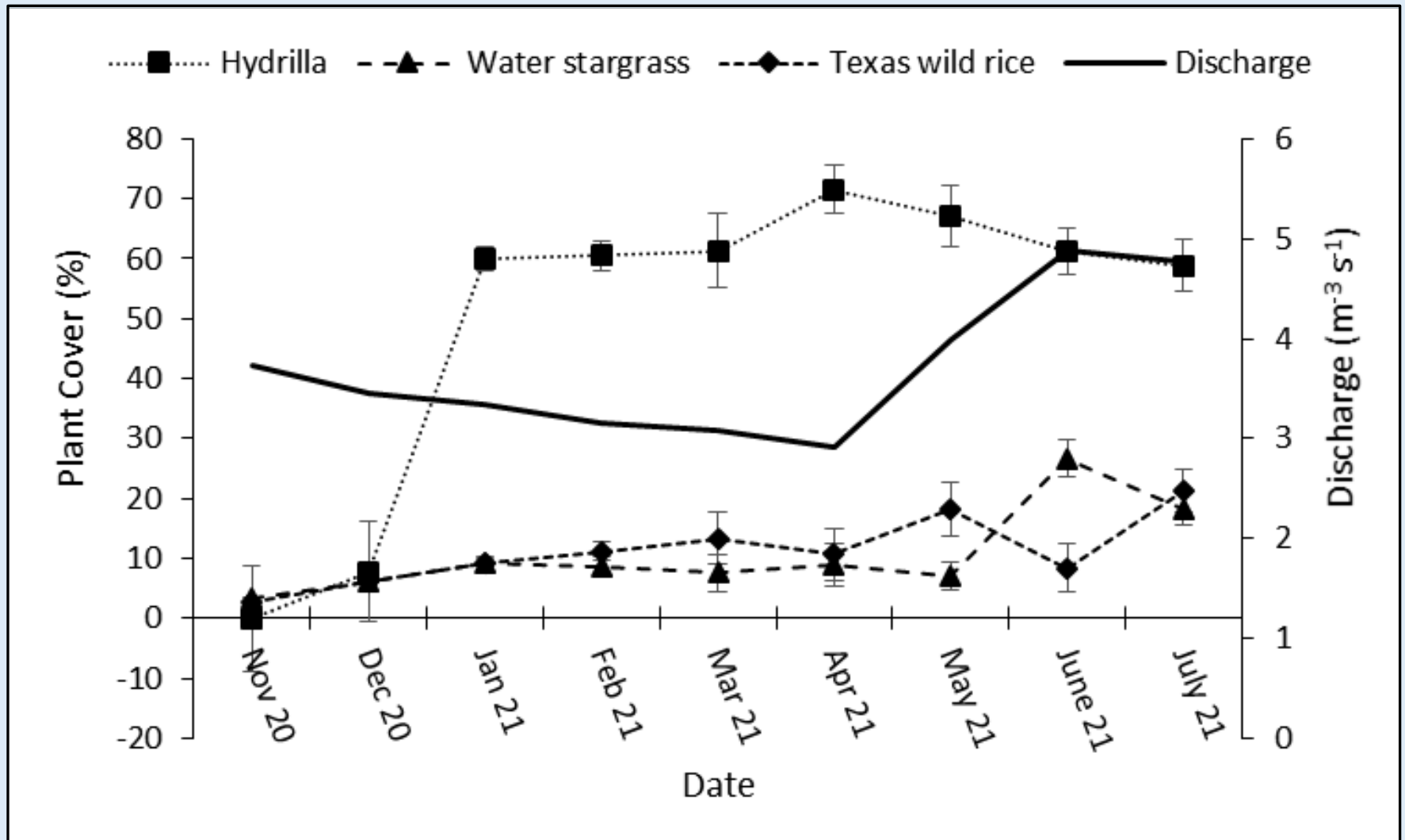
Shoot Biomass



Bar represent Standard Error

$F = 54.52$, $df = 20$, $p < 0.001$

Plant Coverage & Discharge



Conclusions



2021/01/22

Conclusion

- Hydrilla quickly invaded cleared plots by 3 months
- Texas wild rice exhibited low survival but allocated greater root and shoot biomass compared to hydrilla and water stargrass
- Water stargrass did not suppress Texas wild rice

Conclusion (cont.)

- Large areas of hydrilla must be removed and an increased number Texas wild rice and other native planted to suppress hydrilla
- Monitoring and control of hydrilla will be required quarterly in restoration areas in the San Marcos River
- Study limitations

Acknowledgments

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